

OBSERVATIONS ON MALTA FEVER.¹

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DEFINITION.

An endemic disease of long duration, characterised by fever, continuous, remittent, and intermittent in type, in most cases enlarged spleen, profuse perspiration, sudamina, constipation, relapses almost invariably, accompanied by pains of a rheumatic or neuralgic character, sometimes swelling of joints or orchitis, ending almost always in complete recovery; in fatal cases enlargement and softening of spleen, congestion of the duodenum and upper part of jejunum, no swelling or ulceration of Peyer's glands, and the constant occurrence in various organs of a species of micrococcus.

GEOGRAPHICAL DISTRIBUTION.

That this fever occurs at Gibraltar there can be little doubt. Donaldson states that Malta fever and rock fever are identical; and Veale, from his experience at the Victoria Hospital, Netley, is of the same opinion. Mr. White, Her Majesty's Consul, writes that this fever is unknown at Tangier, opposite Gibraltar, and to the eastward of Gibraltar, at Carthage, it is also said not to occur. Dr. Luigi Zauda, writing from Cagliari, Sardinia, states that this fever is well known in that city, and also in the interior of the island.

In Italy it has been described as occurring at Naples, Benevento, and Civita Nova del Samo. Professor Tomaselli describes it as occurring in large numbers, from his experience at Catania, in Sicily. Dr. Perini, from twenty years' practice in Tunis, writes that in 1879 he had the opportunity of observing the first case which occurred there. He goes on to say that, when the French occupation took place, an epidemic of the fever broke out at Goletta, a muddy seaport in the vicinity, and that since then it has become endemic. This fever does not appear to be known at Tripoli. In Constantinople, according to the authority of Dr. Paterson, this fever is common, and is known under the vague term, "country fever." Dr. Davids, of the German cruiser *Loreley*, also states that he had an opportunity of observing fifteen cases of this fever at Constantinople and three at Smyrna. Dr. Antoine Capetanakis writes from Crete that this fever, which tends to become frequent in the town of Candia, is known by various names, such as "Italian fever," "Neapolitan fever," and "new fever." He states that it first attracted the attention of physicians in Candia about eight years ago. From his description there can be little doubt of its identity.

ETIOLOGY.

A Specific Disease.—Nothing very definite is known in regard to the causation of this fever. It is unnecessary to recapitulate the opinions of the various writers, since, if such causes are left out as fatigue, intemperance, etc., there only remains the theory that emanations from decomposing organic matter are the main factor in producing the disease. As in typhoid fever, here also there are two rival schools of theorists: the one claiming for the products of putrefaction pure and simple the power of beginning the morbid process, the other invoking the aid of a specific bacterial organism. There is no mention anywhere of water contaminated by sewage being the vehicle. Tomaselli thinks it is impossible to conceive the rapid diffusion on a very large scale of this fever, if one denies its miasmatic origin. Rummo, moreover, states that in Naples this fever occurs most frequently in the low-lying parts of the town, and especially in the neighbourhood of the openings of the sewers. Information sufficient to constitute good evidence cannot be gained from the patients themselves. They usually assign some trivial cause, such as the effect of the sun or a chill. Very few blame bad smells. This is probably on

account of their familiarity with sewage effluvia, which are not far to seek during summer in most towns on the Mediterranean shores.

Influence of Sewerage.—It is curious that the introduction of the system of removal of excreta by sewers has been looked upon, rightly or wrongly, as coinciding with an excessive development of this fever in Valletta, Naples, and Catania. Eugenio Fazio, in writing of the Neapolitan fever, states that from the time the old-fashioned emptying of cesspools was suppressed and the house drains were carried into the main sewers, which had previously been used for the carrying off of rain water, the hygienic condition of Naples was changed. The faecal materials being collected in a cloacal system which was not well constructed—being not only deficient in downfall, but also in water for flushing—there stagnate and infiltrate the subsoil, especially as this is a porous rock, whence are poured into the atmosphere the products of putrid fermentations.

Tomaselli writes in the same manner concerning the fever in Catania. He states that its occurrence and causation seemed to have some connection with local sanitary conditions, which had been modified by the introduction into the public streets of the sewer system, and the first outbreak corresponded in fact with the epoch of this reform. In his opinion the immense quantity of the results of decomposing organic matter which is developed in these sewers, and finds its way out, must be placed in the front rank of causation. He is certain that, under the existing circumstances, in which there is a scarcity of water for flushing purposes, the city of Catania lies under the malign influence of a poisonous miasma, which is continually given off from these subterranean sources. In like manner it was fashionable in 1886 in Valletta, Malta, to blame the introduction of a general system of drainage for the great increase in the number of cases of this fever during the two years in which the system had been in operation. Among the soldiers this increase had certainly been very marked. And as it appears that the sewers were in operation before an efficient method of flushing was introduced, Tomaselli's words in regard to Catania might have been applied to Valletta. Since 1886, due mainly to the energy of Sir Walter Hely Hutchinson, the Lieutenant-Governor, the hygienic condition of Valletta has much improved.

Incidence at Malta.—The following list gives the number of cases of this fever treated in the Station Hospital, Valletta from 1876 to 1888.

Year.	Cases.	Year.	Cases.
1876	28	1883	27
1877	43	1884	44
1878	56	1885	111
1879	33	1886	91
1880	27	1887	109
1881	53	1888	45
1882	5		

Age and Sex.—Marston states that this disease affects *par excellence* young men under 35, next in frequency children, less frequently the aged. Rummo writes that the disease is found in the young and adults, rarely in infants, and still more rarely in the old, and that sex has little influence, but that it is more common among men than women. Tomaselli is of opinion that the greatest number of cases occur between the ages of 6 and 30, less frequently from 2 to 6, and from 30 to 50; very rare above 50. As the great majority of the English soldiers stationed at Malta are young men, statistics in regard to age are of little value. Of cases treated by me in 1886, 2 were under 20, 76 under 30, and the remaining 6 under 40.

MODE OF PREVALENCE.

Alternates with Enteric Fever.—Malta fever, like typhoid, is an endemic disease in Malta. Marston states that it usually prevails in years in which the typhoid form is in abeyance, replacing, and in turn being replaced by, typhoid fever, and sometimes occurring concurrently with it. This statement agrees with my experience, as in 1885 and 1886 there was much Malta fever and little enteric; in 1882, 1883, and 1884, few cases of Malta fever and a decided increase of typhoid. In 1881 the Malta fever was again predominant, as also in 1877. In other years the fevers seemed to occur concurrently. But these observations are too few to be of much value, and the point is merely referred to on account of its curious nature.

Malta fever sometimes occurs as an epidemic. Tomaselli thinks [1481]

¹ *Synonyms.*—Mediterranean fever (various writers); gastric remittent and bilious remittent fever (Marston, 1861); Mediterranean gastric remittent fever (Chartres, 1865; Boileau, 1866); *la febbre gastrobilitosa* (Gulia, 1871); faeco-malarial fever (Donaldson, 1876); intermittent typhoid (Borrelli, 1877); adeno-typhoid (Cantani); *febris complicata* (Veale, 1879); *febris sudoralis* (Tomaselli, 1880); rock fever; Neapolitan fever, etc.

it no exaggeration to call the two outbreaks which occurred in Catania in 1872 and 1878 epidemics. In 1885 this fever occurred in an epidemic form among the troops stationed in the Floriana Barracks, Malta; and the outbreak in Verdala Barracks, described by Chartres in 1865, is another instance of the same.

Months and Seasons.—In regard to the months and seasons in which Malta fever is most prevalent, the following list represents the total number of admissions for this disease into the Station Hospital, Valletta, for eleven years. From it, it will be seen that the summer is the season of greatest prevalence, and that most cases occur in the month of July:—January, 12 cases; February, 13; March, 20; April, 23; May, 75; June, 80; July, 102; August, 52; September, 42; October, 38; November, 32; December, 12.

Previous Diseases.—Several patients have come under my charge suffering from Malta fever, who have previously had enteric fever; and in regard to malarious fever, also, it seems that previous attacks do not afford any protection from Malta fever. Chartres states that, out of 41 cases, 32 had suffered from ague in Canada and elsewhere. Lastly, it may be stated, in regard to predisposing causes, that Malta fever attacks officers and their families, living in large, well-ventilated houses, probably in as large a proportion as it does the soldiers in the more crowded barrack-rooms.

The Question as to its Contagious Nature.—Tomaselli states that it is not contagious, from the fact that members of a family sleeping in the same bed, of whom one was seriously ill for a long time with the fever, remained in the best health; and, further, that he observed isolated cases in the country which showed no tendency to spread. Marston is also of the same opinion. In the Station Hospital, Valletta, although cases of this fever are to be found all the year round, scattered through the various wards, there is no evidence that it has been communicated to any of the other patients in a single instance.

INCUBATION.

It is impossible to say definitely how long the period of incubation is. In 51 cases, 42 stated that the fever had come on slowly and insidiously, the remaining 9 that the onset was sudden. The only data on which I found an approximate idea are the following: 1. Chartres states that, six days after the 100th Regiment entered Fort Verdala, the first of a series of cases of this fever occurred. 2. Marston gives the case of two men who bathed in a dirty part of the Grand Harbour, and were both attacked with fever ten days afterwards. 3. At the beginning of this year, an officer, who blamed a long exposure to foul emanations in one of the filthiest parts of the Quarantine Harbour, was placed on the sick list after nine days.

IMMUNITY FROM SECOND ATTACK.

Galia states that this fever is often manifested more than once, and gives the case of an English lady who had three separate attacks. This is a difficult question, and requires further investigation. In a fever which may last two years, according to Veale, there is always the danger of mistaking a relapse for a separate attack. In my opinion, one attack does confer immunity.

CLINICAL DESCRIPTION.

Early Symptoms.—A patient suffering from the fever, on being admitted to the hospital is usually loth to give any information in regard to his symptoms. By dint of patience you draw out of him that he has been feeling out of sorts for a week or two; he has had no interest in life; his appetite has been fickle; vague feelings of discomfort, as shiverings, sickness, headache, and pains in his bones, have often been present, and to escape his now irksome and wearisome duties he has sought admission to hospital. For the first week or ten days he often suffers from sleeplessness and headache, which may vary from the mildest form to the most intense, very often frontal, and more rarely shooting from the occiput through the eyes. In these severe cases the face is usually congested, the anterior temporal arteries are seen pulsating, the ears are ringing, and epistaxis may occur. His tongue is usually covered with a thin, yellowish-white fur; it is large and flabby; the edges and tip are red, and it is usually marked laterally by the teeth. Congestion of the pharynx is often present. The appetite is absent; there is nausea, sometimes causing vomiting, and a feeling of weight and tenderness in the epigastric region. The bowels are constipated, as a rule, but errors in diet, or excessive use of medicines, may bring on attacks of diarrhoea. The stools are often streaked with blood. The spleen and liver are enlarged, and both may be tender on pressure. Tympanites is un-

common, but may occur, as also may gurgling in the iliac fossa. During this time, almost invariably, a slight cough, with scanty expectoration, is developed, and, on examination, the breathing at the bases is found to be unsatisfactory, harsh and creaking in character, with now and then a moist crepitation. Morning after morning you look in vain for rose-coloured spots on the abdomen, but you find that the patient is bathed in a most profuse perspiration, and a more or less abundant crop of sudamina is developed. He may have had a little delirium at night during this time, but this is rare, and is so slight as scarcely to call for remark. Unless there is severe headache or pain in the lumbar region, the patient during the first week or two usually professes that he suffers very little. At the end of this period the headache and acute symptoms usually disappear, and the long and monotonous period of the fever begins, a period which seems interminable alike to medical officer and patient. The patient's aspect is natural, but listless; his tongue is clean; he has a wish for solid food, which must often be denied, and his bowels require the stimulus of an aperient or enema for evacuation.

Later Symptoms.—The profuse perspiration still continues, and day after day he becomes weaker and loses weight, until he has scarcely power to stagger a few yards. His red blood corpuscles diminish in number, and his complexion changes from pale to sallow, and from sallow to a dull clay colour. During this period his temperature often ranges high, but he professes to be quite unconscious of any change in his condition. He sleeps moderately well, has no delirium nor restlessness, is uncomplaining, and takes without any ill effect a large supply of fluid food and stimulants. The only variety in his condition is afforded by a rheumatic affection of the joints; one day it is his knee which is red, swollen, and intensely painful on being touched; a few days after it is a swollen and deformed wrist which he holds up for commiseration. Sometimes almost every joint in his body is attacked in this manner, or he may have intercostal neuralgia, sciatica, or an inflamed and swollen testicle. In this way many weeks are long drawn out, but at last his temperature fairly comes down to the normal, and he begins very slowly to improve, his blood corpuscles gradually regain their normal number, his weight increases, and his strength is slowly restored. This is a clinical picture of an ordinary well-marked case, but the fever may occur in such a mild degree that the rise in temperature is the only morbid phenomenon. On the other hand, it may be so severe as to be absolutely indistinguishable from the most rapidly fatal cases of typhoid.

PRINCIPAL SYMPTOMS IN DETAIL.

Physiognomy.—The expression of face in the great majority of cases may be summed up as being dull, listless, apathetic, anæmic. During the first onset, when there is severe headache, the face and exposed mucous surfaces are often congested, and the patient has an excited, restless look, but this soon disappears and is replaced by lethargy. In long and severe cases the face may become of a dull blue clay colour, and, as the patient in this condition has left all hope behind, his expression is naturally dependent in the extreme.

Alimentary System.—The tongue is at first more or less thickly covered with grey or yellowish grey fur; afterwards, as a rule, it is large, flabby, indented by the teeth, and covered with a thin translucent fur, except the tip and edges, which are red. In about 10 per cent. of the cases the tongue becomes dry and brown for some days during the progress of the disease, and cannot be distinguished from the typical typhoid tongue. In a few cases the dorsum of the tongue becomes fissured, with a little blood oozing from the fissures. In many cases the gums, as the disease advances, are found to be soft and spongy. In some cases, bleeding from the gums is noted. In one case, on the ninety-fourth day of disease, the gums were found to be spongy; the lower half of a dark claret colour, the upper pale and livid. The fauces are usually somewhat congested. Vomiting, except in very severe attacks of this fever, is not a marked symptom; the vomited matter is frequently streaked with blood. Nausea is much more commonly complained of than vomiting, and, as is natural, anorexia is almost invariably present at the beginning of the fever. Constipation is one of the marked features of the disease. In 65 cases in which the condition of the bowels was noted, in 48 there was constipation and in 17 diarrhoea. Murchison states that he noted constipation in 4 and diarrhoea in 93 out of 100 cases of enteric fever. It is evident that in Malta fever constipation is the rule and diarrhoea the exception. The reason of this is not far to seek. In *post-mortem* examinations of enteric fever, as it occurs in

England, ulceration and an inflamed condition of the lower end of the small intestine are found, which must necessarily have tended to diarrhoea. In the so-called Malta fever no such ulceration is met with. Tympanites is rare, and ascites was only noted in one case. The liver is usually slightly enlarged, sometimes painful on pressure, and slight jaundice has been noted in a few cases.

Respiratory System.—Epistaxis occurs in about one-sixth of the cases. Cough at one time or another almost always occurs, and is marked in one-half the cases. Expectoration is sometimes profuse, and is often streaked with blood. Even when there is no cough the breathing is found to be unsatisfactory, and, on auscultation, sounds harsh and bronchitic. Not uncommonly slight touches of pleurisy are experienced in the severe and protracted cases. Dyspnoea was noted in one case, and, on examination, no grave condition was found to account for it. Pneumonic consolidation is rare, not occurring in more than 2 per cent. of cases.

Circulatory System.—Palpitation of the heart becomes developed in many. The pulse may be said to range between 70 and 120. During the first period of the disease, although the temperature may range high, the pulse is frequently found to remain low, 80 to 90. As the fever progresses and the heart becomes weakened, its rapidity increases, so that about the fortieth or fiftieth day 110 to 120 beats per minute are often registered. The highest pulse-rate I have noted in a non-fatal case was 132 on the seventy-eighth day of disease.

Blood and Blood Glands.—Only in rare cases are there particles of pigment to be seen on examining the blood with the microscope. The red blood corpuscles, as a rule, fall from 5,000,000 per cubic millimetre to about 3,500,000. The white blood corpuscles in most cases are found to be diminished in number. The spleen is almost always enlarged, and frequently painful on pressure. In a few cases severe pain is complained of in the region of the spleen.

The Temperature.—The chief characteristic in regard to the temperature curve in this fever is its irregularity. The type varies from the continued to the intermittent. One case is almost continuous throughout, another almost intermittent; some begin with a marked intermittent type of temperature curve and pass into the continued, whilst others again begin as continued and pass into the intermittent. Some severe cases show a long irregular elevation of temperature, only reaching normal limits about the ninetieth day. An undulatory course is frequently observed in this fever, the undulations being separated by a period of apyrexia. These undulations, which represent relapses, sometimes persist for a long time, in some cases for six months or even longer. The temperature curve, as a rule, runs high, reaching 104°, 105°, and even 106° F. In fatal cases the temperature often runs up to 110° before death, and in one case 111.5° was noted.

Genito-Urinary System.—In a few cases this fever is complicated by the occurrence of orchitis. Albumen is found in the urine in the most severe cases, but this appears to be a rare occurrence.

Tegumentary System.—Perspiration is one of the characteristic symptoms of this fever, hence the name *febris sudoralis*. In about one-half of the cases it may be said to be profuse. Crops of furunculi sometimes occur, and purpura has been noted in one case. Sudamina in greater or less number are almost invariable. Nothing corresponding to the rose-coloured eruption of typhoid fever is met with. Towards the conclusion of the fever the hair frequently falls out extensively.

Nervous System.—Slight delirium occurs in about one-sixth of the cases, and sleeplessness at the beginning of the illness is the rule. I have noted partial loss of memory in one case, and irritability of temper occurs not infrequently. Want of sensation in both arms occurred in one case, and hyperæsthesia of the lower extremities also in one. Loss of muscular power and inability to raise the straight arm above the horizontal was found in one case, and this condition persisted for several months. Headache is complained of by more than a third of the cases, usually frontal, next in frequency occipital, and least commonly confined to the vertex. Pain in the lumbar region is a frequent symptom, and sciatica in one or both nerves occurs in about one-twentieth of the cases.

Pain and Swelling of Joints.—This very characteristic symptom is noted in nearly half the cases. The joints most commonly affected are the shoulders and knees, next in frequency the hips, then the elbows and wrists, and lastly the ankles. The amount

of effusion, say, into a knee-joint, is sometimes very considerable, but in no case have I seen suppuration occur.

Special Senses.—In about a tenth of the cases dulness of hearing is complained of, and in very rare cases a patient is found who complains of dimness of vision.

DURATION OF THE FEVER.

Soldiers show an average stay in hospital of nearly ninety days. The length of the fever may vary from fifteen days to as many weeks or more; in fact, Veale mentions a case which lasted two years. One case which came under my observation was admitted to hospital in July, 1885, and, with the exception of February and March, he was in hospital suffering from this fever and its sequelæ until the end of the following year.

DIAGNOSIS.

From Enteric Fever.—Is this fever enteric fever? If Murchison's dictum was accepted, namely that in enteric fever, the specific lesions, consisting in a disease of the agminated and solitary glands of the ileum, are invariably present, then this question could at once be answered in the negative; since in all the *post-mortem* examinations on record of fatal cases of Malta fever, no such characteristic lesion has been found. But that this dictum is not invariably accepted can be readily proved. For example, Tomaselli writes that in his country it is not rare in *post-mortem* examinations of enteric fever cases to find no ulceration of Peyer's patches, or of the solitary follicles, and no enlargement of the mesenteric glands. In the same way Professor Borrelli may be quoted as saying, that, given the typhoid infection, the lesions of the lymphatic elements of the intestine are always liable to occur, but that it is worthy of note that they happen with much greater constancy in the old and known form of typhoid than in that under consideration. The various opinions which have been held on this subject may be given in a few words. Marston thinks that its long duration, comparative non-fatality, the absence of exanthem, pulmonary disease, marked diarrhoea, and those abdominal symptoms characterising typhoid, will remove it from that disease, with which at one time he says he confused it. The same opinion is held by Veale, who states that its non-identity with our enteric fever appears certain from the fact that it has neither its clinical form, nor its mortality, nor its specific anatomical lesion. Tomaselli is very doubtful on the subject; he writes that if he is asked to determine the nature of this fever, he would find himself much embarrassed for a reply, but of this he is sure that it does not depend for its origin on the same specific cause as typhoid. At the same time he is inclined to think it is very closely allied. Cantani goes a step further, as he believes that this disease is in reality a form of typhoid localised in the mesenteric glands to which he gives the name of adeno-typhoid. A like opinion is held by Borrelli, who also gave a name to the fever by calling it intermittent typhoid. So also Tommasi, who writes lately that in his opinion Neapolitan fever must be identified with typhoid. Thus it is evident that the difference between English and Italian writers is that the former cling to the principle that enteric fever has a specific lesion, while the latter do not.

Evidence from Bacteriology.—The evidence afforded by the bacteriology of Malta fever and enteric fever appears to me a strong proof of their specific difference. I have examined in all ten fatal cases of Malta fever for bacteria. I have also examined several fatal cases of enteric fever from the same hospital wards. The examinations by means of cultivation experiments, etc., were conducted in precisely the same way. In all the cases of Malta fever there was found a minute berry-shaped bacterium, whereas in all the typhoid cases there was found a much larger rod-shaped bacterium. The micrococcus of Malta fever planted on agar-agar, and kept at a temperature of 35° C. showed no signs of growth for at least four days. On the other hand, the typhoid bacillus under the same circumstances showed marked growth at the end of twenty-four hours. Further, the micrococcus of Malta fever, inoculated into a monkey, caused death after twenty-one days, and from the spleen and liver the same micro-organism was recovered.²

From Remittent Fever.—The question whether Malta fever is malarious has always been a matter of controversy, and at the present time the opinions of medical men in Malta seem to be pretty equally divided on the subject. If anything, the tendency is to answer in the affirmative. In a report lately written by a surgeon who has been in the island for several years, it was stated that there could be little

² *Vide Practitioner*, September, 1887, and April, 1888.

doubt of the malarious character of this disease. This opinion is also held by some of the most experienced Maltese medical practitioners. The opinions of the various writers on this disease, on the other hand, rather tend to throw doubt upon the malarious origin of this fever. At the outset, a difficulty is met with on account of the vague use of the terms "malaria" and "remittent fever." Heidenstam, in his report on the fevers of Cyprus, seems to hold the most reasonable view, when he states dogmatically that intermittent and remittent fevers are due to palus or paludal miasma, known as malaria, and that the assumption that those fevers may result from other causes than from infection of malaria is simply puerile, and not based on correct principles. In this paper, then, it must be understood that there is but one malaria which gives rise to malarious fevers, which consist of the varieties intermittent and remittent, these being the same disease, differing only in degree. Marston, in 1861, although he uses the term malarious disease, is of opinion that it is not identical with marsh miasma. Boileau, in 1866, says that it appears very doubtful if Malta fever has any connection with paroxysmal fever. Gulia, in 1875, thinks it is difficult to believe that it is caused by the miasma of periodic fevers, as there are no marshes or stagnant waters in Malta, but is of opinion that a damp, porous soil, exposed to powerful solar rays, may give rise to malaria. Donaldson writes that Professor Maclean's opinion that there is a stout thread of malaria running through this fever must be accepted as true. Veale, in 1879, thinks that it is not malarious, and this seems proved by its absolute resistance to quinine, by its protracted duration after the removal of the sufferers from a malarious locality, as well as by its different aspect and progress throughout. In the same year, Tomaselli, writing on this fever in Sicily, states that malarial fevers were plentiful in the years when this form of fever also occurred. He thinks that there is a certain analogy between its producing agent and malaria, but that there exists a great difference he shows by comparing the course of the two fevers, and their behaviour towards quinine. My own opinion is that Malta fever is quite distinct from intermittent and remittent fever, the only similarity being that in both Malta fever and malarious fever the specific virus is in all probability air-borne. The following considerations may be thought to have some weight in this connection: If the fever under consideration is true remittent fever, then Malta must be malarious, since, according to Flint, "true remittent fever is never contracted elsewhere than in malarial situations." If Malta is malarious, then ague must occur, since, in the words of Hirsch, "the most widely distributed form of malarious fever is ague, which is met with at all times and in all places, whenever and wherever the disease is endemic or epidemic." Now, if it can be proved that ague does not occur in Malta, it will be a strong argument that this fever is not the true remittent. It may be asserted that for several years not one single case of ague of Maltese origin has been admitted into any military hospital in Malta; and Gulia states that cases of intermittent fever are never developed in the cities of this island. A quarter of a century ago it is doubtless true that ague did occur to some extent in certain low-lying, damp, undrained situations, such as the Marsa, but this no longer obtains; and it would be just as reasonable to argue that the large mass of fevers in London are malarious, on account of a few cases of ague still occurring in some parts of England, as to assert it of the fevers in Valletta. There is no reason, then, to doubt the truth of Hirsch's assertion that Malta enjoys a complete immunity from malaria, except at a few isolated spots. The absolute resistance of this fever to quinine must also be considered a cogent argument against its being remittent fever. True remittent fever, on the other hand, has been shown again and again by the most trustworthy evidence to be powerfully affected by this drug. Lastly, the long monotonous course of this fever surely presents a marked contrast to remittent fever, in which the patient's subjective feelings are subject to so great variation.

Rate of Mortality.—Not the least extraordinary feature of this fever is its low death-rate. From the result of my observations I would put it as low as 2 per cent., which is very different from that which obtains in typhoid fever.

PATHOLOGICAL ANATOMY.

Partly on account of the rarity of fatal cases in this fever, and partly on account of the difficulty of obtaining *post-mortem* examinations in Roman Catholic countries, no detailed account has yet been given of the microscopic examination of the tissues. As would be expected, the changes found are those due to high temperature and some irritating property in the blood. On making a section

through a Peyer's patch and examining it under a low power, the serous, muscular, submucous, and mucous layers are found to be unthickened and almost normal in appearance. The epithelial layer is continuous over the surface of the gland. Under a high power morbid changes are found restricted to the mucous and submucous layers, and consist in a slight proliferation of the cellular elements. On examining the large endothelioid plates of the glandular tissue they are seen to be somewhat swollen and proliferating, and there is a slight proliferation of the adenoid tissue. The mesenteric glands are only slightly enlarged; there is proliferation of the cellular elements of the lymphoid tissue; the reticulum is very delicate, and appears in places to be almost obliterated by the increase in the number of the cells; there is some proliferation of the endothelioid plates, and they are in a condition of cloudy swelling; the spleen weighs on an average 18 ozs., and is soft and diffuent; the Malpighian bodies are enlarged from an apparent increase in the number of the round lymphoid cells; the endothelioid plates of the marginal sinuses are proliferating and swollen; a condition of intense congestion is seen in the section, the sinuses being enormously distended with blood; there is a marked exudation of small round cells along the lines of most of the venules; the liver is congested, the cells in a condition of cloudy swelling, and there is an infiltration of small round cells in the interlobular fissures; the kidney is also congested, and in a condition of glomerular nephritis. In the spleen single micrococci are seen scattered throughout the sections in enormous numbers. Micrococci similar in appearance to those seen in the spleen are also found in smaller numbers in the liver and kidney.

TREATMENT.

Prophylactic.—The only way to lessen the number of cases of Malta fever among the British soldiery would be to remove the men from the unwholesome barracks in Valletta and Verdala, and place them in a large standing camp on the flat summit of one of the hills some few miles off. There a good water supply could be found, and an efficient system of drainage readily provided. Of course, it would be impossible to have all the soldiers in Malta in a standing camp of this sort, as the function of the soldier is not to preserve his own health, but to preserve guns and forts. There can be no doubt that the porous limestone upon which Valletta is built is saturated with the filth of centuries, and even although good drainage be established it will take another hundred years for the slow process of oxidation to purify the rock.

Medicinal.—As the result of many observations it seems evident that, in Marston's words, quinine does not exert any directly curative or beneficial influence on this fever, and in regard to the symptoms, although it may in isolated instances relieve headache, still the disagreeable results of deafness and ringing in the ears seem to more than counterbalance the slight good effect. And it does not seem to matter in what form the quinine be exhibited, whether as the bisulphate, the salicylate, or Warburg's tincture. It has been urged by some medical officers that quinine given *per rectum* acts like a charm, not only lowering the temperature, but also cutting short the disease. If this could be proved, it would be a grand triumph of medical art, but from several observations I found quinine quite as inert given by the rectum as by the mouth. Further, it has been maintained that the subcutaneous injection of the drug was the secret of success, and an officer who had suffered from the disease for months both in Malta and England assured me that medical men in Malta did not know how to treat the disease, and that he had been cured by the above method. As this officer complained bitterly of the intractable ulcers which remained at the site of injection, there did not seem sufficient justification to try the method on the private soldiers in hospital. Of course, this fever tends to spontaneous cure, and it is natural that the manner of treatment which is being used when the febrile action ceases should get the credit of performing the cure, especially in the unscientific mind labouring under the weight of the little knowledge gained by personally suffering from the disease.

Antipyrin.—This drug, given to the amount of 60 or 90 grains, causes a fall in body heat of many degrees in a few hours. Headache usually disappears for a time shortly after the administration of the drug. It is also useful to combat sleeplessness in some cases. So it may be said that, although antipyrin has no curative action in the disease, still it is very useful in alleviating distressing symptoms.

Eucalyptus.—Tomaselli is the only writer who mentions this drug in connection with the fever under consideration. In his

opinion it did not give good results. As Musser, of Philadelphia, in his paper entitled "Oil of Eucalyptus in some Malarial Affections," seemed to show that the drug is useful in certain febrile states, I made a number of observations with the medicine in Malta fever. In the cases in which it was given it was always well borne, and as it is said to act as an antiseptic, carminative, and stimulating expectorant, further experience may prove it to be really beneficial. My own opinion is that it has no effect on the course of the fever.

Aconite.—At the beginning of the fever, when the temperature was high and continuous, some observations were made on the action of this drug, which was usually given in five-minim doses for several consecutive hours. The drug did not seem to have any effect on the temperature or on the general febrile condition.

Calomel.—Tommasi states that this drug seems to shorten the course of the fever when there is no diarrhoea. Gulia writes that it is the sovereign remedy and anchor of hope in some cases of this fever, and gives it as far as to induce slight irritation of the mouth. Marston thinks the occasional exhibition of a mercurial (calomel), combined with ipecacuanha and rhubarb, or colocynth, is very useful. I have never made any observations on the action of this medicine in Malta fever.

Salicylic Acid and the Salicylates.—Rummo states that he has tried salicylate of soda, but with negative results. Tomaselli is of opinion that salicylates used in cases of continuous high temperature tend to depress the heart, to weaken, to aggravate the sweating, and show no counterbalancing good effects. I think there is a temptation to exhibit this drug, especially in those cases in which the joints are painful and swollen; but as this condition is always associated with anæmia and depression of all the vital functions, this medicine ought to be avoided.

Other Drugs.—Finally, in regard to other medicinal treatment, Veale writes as follows: "Colchicum, with or without saline aperients, also in combination with aconite or quinine, arsenic, turpentine, salicylic acid, the hyposulphites, and many other drugs have been tried as freely as seemed to be safe, but no reliance can be placed on them, either to arrest the fever or even to diminish the night-sweats or the rheumatoid pains. Carbolic acid has been tried both by the mouth and subcutaneously. In no case did it do any good; in several it did very positive harm when injected under the skin. The solutions of carbolate of ammonia and of carbolic acid in combination with iodide of potassium, as recommended by Déclat and others, have also been used for hypodermic injection, but without any advantage. When the hæmorrhagic tendency has been a source of danger, the continued use of the tinctura ferri perchloridi has seemed to be beneficial. Ergot and ergotin have also been of service in arresting hæmorrhage and checking bronchorrhoea when it has been profuse, but neither remedy has any influence in arresting the progress of the disease. The hypodermic injection of morphine, and the liniments of aconite, opium, and belladonna are useful in relieving the lumbar, sciatic, and articular pains; but blisters appear only to substitute temporarily one pain for another."

CONCLUSIONS.

1. Malta fever is a specific disease quite distinct from enteric and remittent fever.
2. It is caused by the entrance into the system of a minute parasite.
3. No drug at present known has any power of modifying the action of the bacteria in the system.
4. Treatment is to be principally directed to keeping the patient's strength up by fluid, easily digested food, and, when required, by stimulants, and by attention to ordinary hygienic principles. Removal of the patient from the infective area does not cut short the course of the fever.

A NEW MYDRIATIC.—Bamberger and Müller (*Berichte der Chem. Gesell.*) have prepared from hydronaphthylamine a compound which promises to prove a powerful mydriatic, bearing the systematic name of tetra-hydro-beta naphthylamine, and having the formula $C_{10}H_7H_2NH_2$. According to Professor Filhene, of Breslau, the instillation of a small quantity of a 5 per cent. solution causes the dilatation of the pupil of the eye treated only, though after absorption of a minute quantity both eyes become affected. The dilatation is greater than that produced by atropine. This compound is said (*Chemical Gazette*) to act as a mydriatic by stimulating the nerve-endings instead of by paralyzing the muscles of contraction as does atropine.

A SUCCESSFUL CASE OF LORETA'S OPERATION ON THE STOMACH.

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So far as I am aware, only one successful case of Loreta's operation for non-malignant stricture of the pylorus has been recorded in this country. This single case was fully reported in the *JOURNAL* for February 19th, 1887. The operator was Mr. Robert Hagyard, of Hull. The patient was a woman, aged 51, who had been troubled with gastric symptoms for five years. She had become greatly emaciated; she was unable to take any food by the mouth, and the stomach was extremely dilated. No tumour could be detected in the vicinity of the pylorus. The operation was performed on March 7th, 1886, and the woman made an uninterrupted recovery. Mr. Hagyard, in a letter to me dated February 21st, 1888, writes: "The patient is perfectly well, there being no return of the symptoms of obstruction. The dilated stomach, which was so difficult to lessen, has now subsided, and my patient has just recently married again." A more admirable result modern abdominal surgery could scarcely claim.

The present patient was a carman, aged 27, who was admitted into the London Hospital under the care of Dr. Ralfe, on October 12th, 1887. He was suffering from vomiting and from severe gastric pain. There was nothing noteworthy in the patient's family history. With regard to himself, he had never had any previous illness of a definite kind. He had, however, led an irregular life, and had been a heavy drinker. His general health had suffered in consequence of his intemperance. He had never had syphilis. Three years ago he was kicked by a horse in the epigastrium. He became collapsed, and suffered much abdominal pain; he believes he vomited. He thought little of the injury, and was only laid up seven days. Eleven months before his admission into the hospital he began to experience gnawing pains in the belly in the region of the epigastrium. Previous to this he had had attacks of "disordered stomach," had impaired appetite, and occasional "bouts" of vomiting. He ascribes these symptoms to excessive drinking. The gnawing pain was a new feature. The pain increased in severity and in duration. It was paroxysmal, came on at intervals of one to three days, and appeared usually a short time after a meal. Very soon each attack of pain was followed by vomiting. The matter ejected was described as brownish, and he states that on each occasion he brought up a quart or so. The vomiting gave him relief.

The pain became more severe, and shot through to his back. He never passed a day without vomiting; he began to lose flesh, and was afraid to take food. During some of the attacks he stated that he became a little yellow. He does not appear to have ever had distinct jaundice. Some months before admission he had commenced the use of morphine, which he ultimately took on every opportunity. He now suffered from constipation.

On admission (October 12th, 1887) he was very feeble, anæmic, and much emaciated. He complained of an incessant gnawing pain in the right hypochondrium, and of occasional attacks of severe paroxysmal pain in the same region. During these attacks he would roll about in bed and scream, but it is possible that the paroxysms were a little coloured by his craving for morphine. The pain came on every few hours on some days, and was described as resembling colic. It was almost immediately induced by taking food. So marked was this that he was afraid to eat. He vomited copiously at least once every day, and was troubled with eructations of foul gas. The bowels acted about once a week. The tongue was broad, pale, and flabby, the pulse feeble, the temperature normal. An examination of the abdomen revealed a great dilatation of the stomach; there was much tenderness complained of in the epigastric and right hypochondriac regions. The seat of the greatest pain was a spot about one inch and a half above the umbilicus. This pain was always described as shooting back to the spine. There was no jaundice; the urine was scanty but normal; the liver, spleen, lungs, and heart were reported as healthy. On the day after admission the patient vomited three quarts. When the stomach was empty, a little dulness was made out in the vicinity of the pylorus. It blended